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(54) A wrist-mounted retractable writing or other instrument

(57) A pen or pencil 12 is attached by a cord 14 retractable into casing 20 (Fig 1) and securable to the wrist by a strap 24. The cord is attached to a rewinding coil spring (28, Fig 3) inside the casing which may be a watch. The instrument may be stored within a sleeve 32, or the casing itself (Fig 4), from which it can be extracted by grasping the exposed front end of instrument and pulling it out to a suitable cord length. The cord may latch to release tension to enable writing. After use the latch is released and the instrument retracts, the nib or point retracting also. The instrument may also be an earpiece, tool or barcode reader.

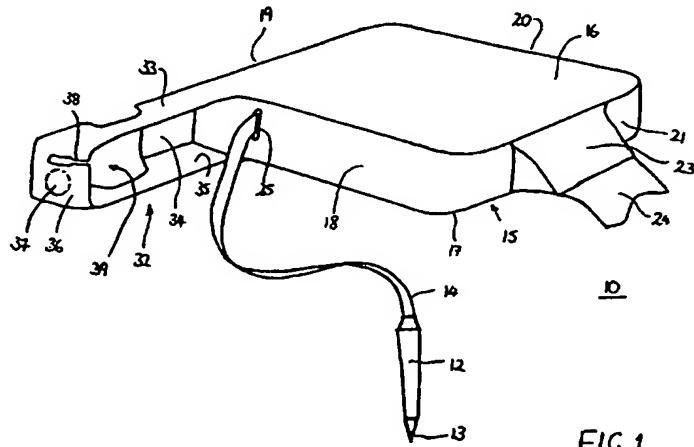


FIG 1

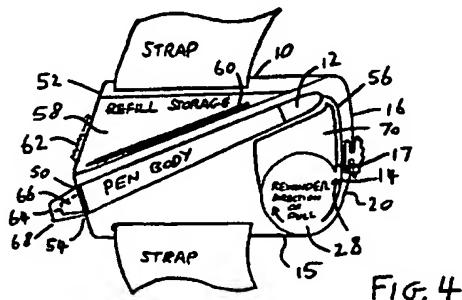


FIG. 4

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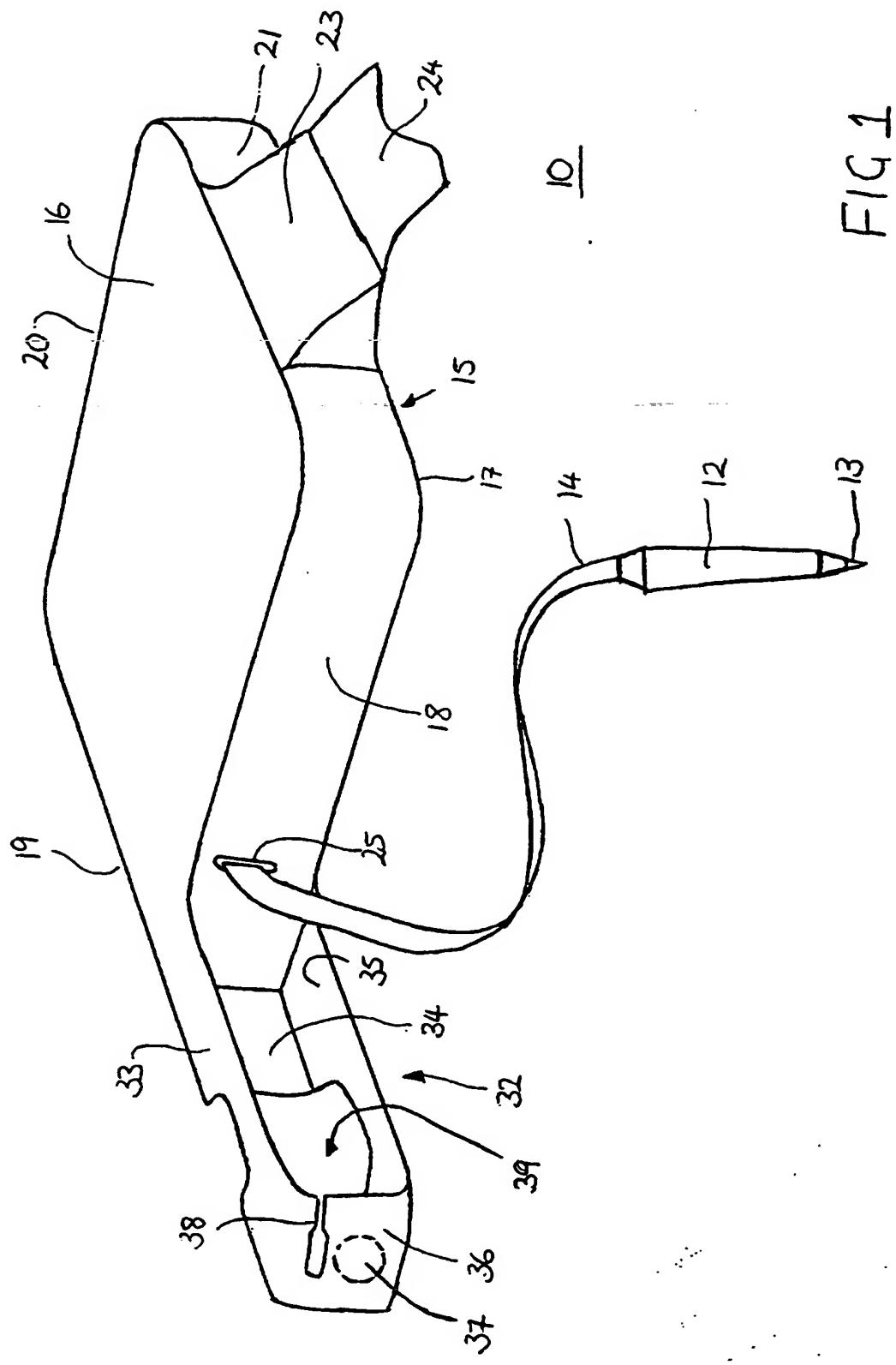


FIG 1

214

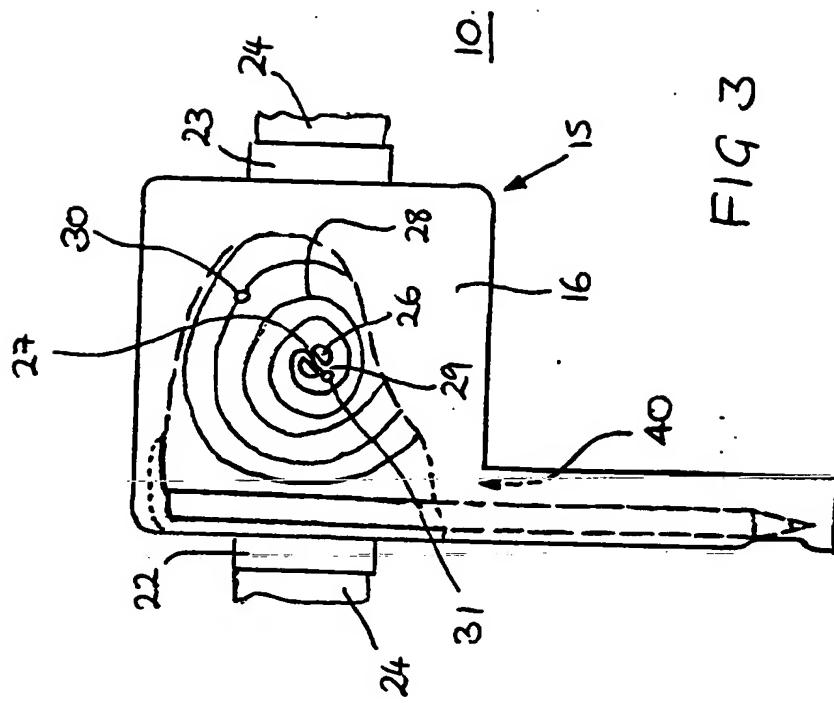


FIG 3

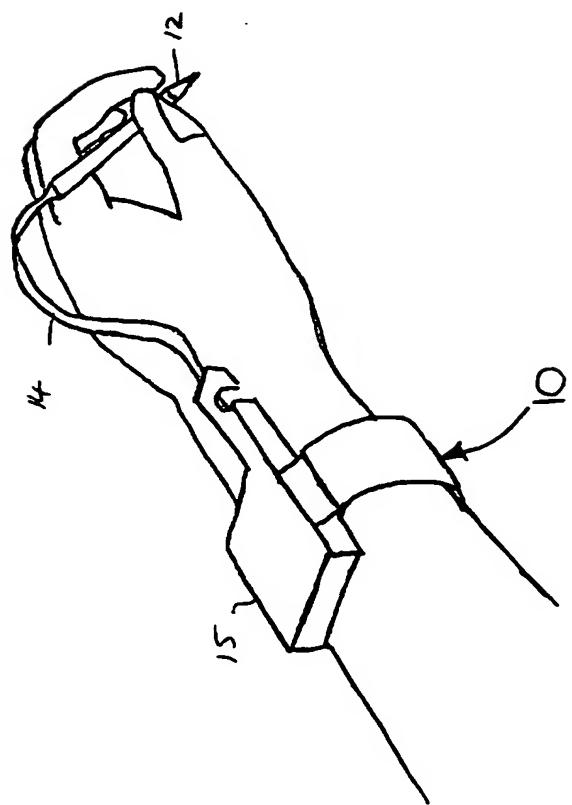


FIG 2

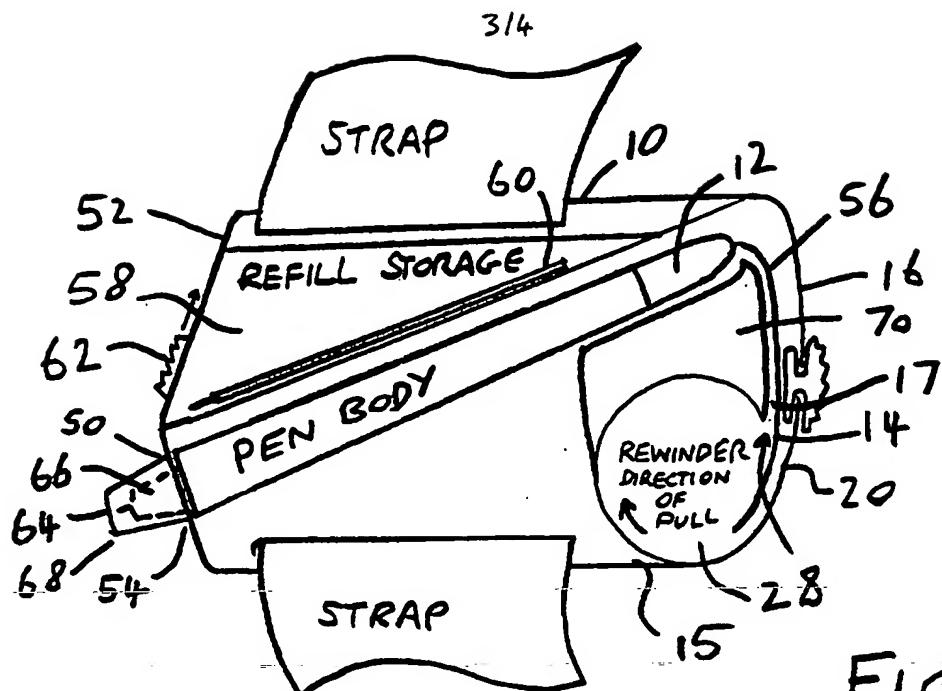
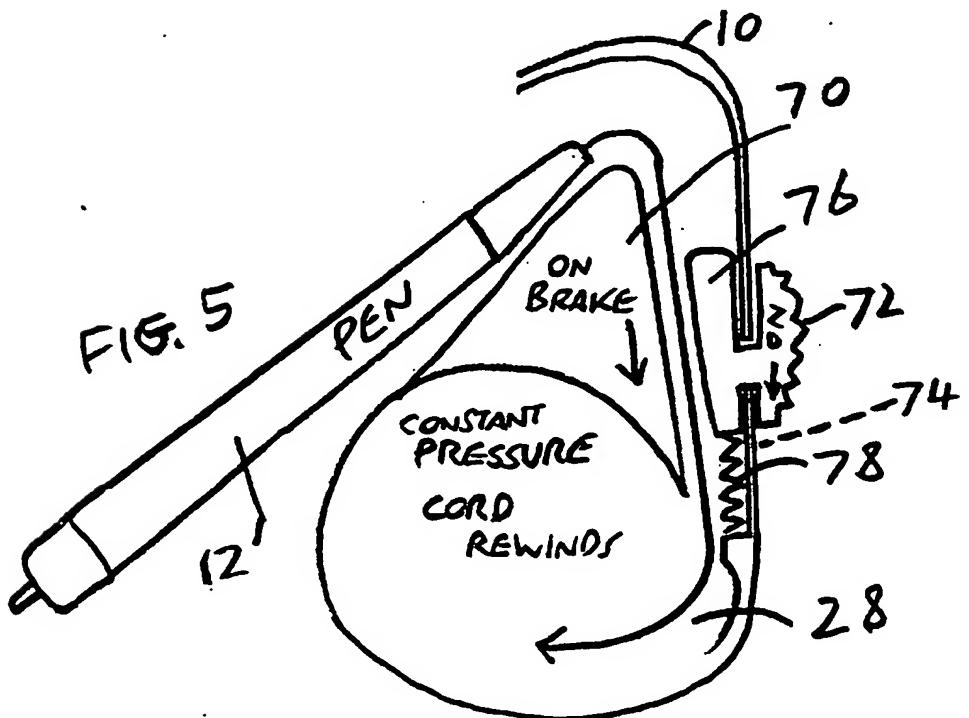
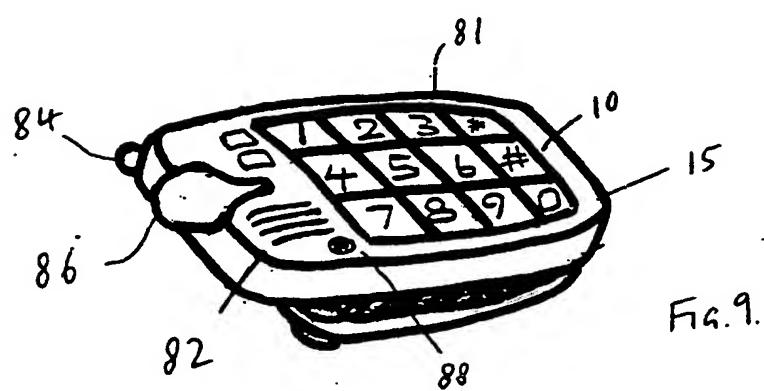
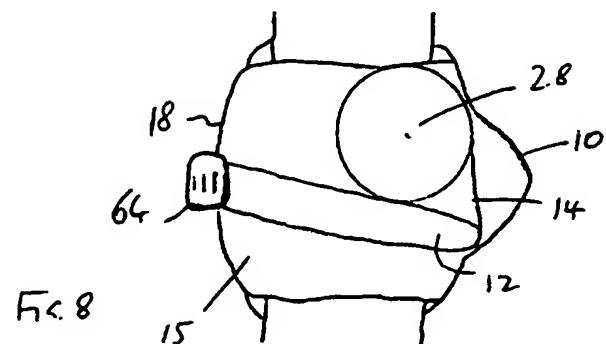
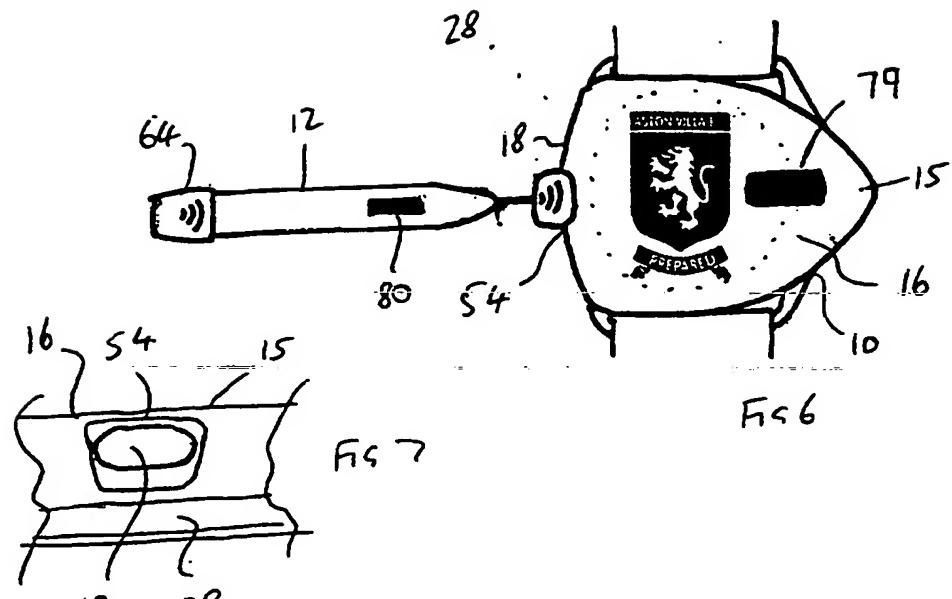


FIG. 4





A RETENTION DEVICE FOR AN IMPLEMENT

The present invention relates to a retention device for an implement, particularly, but not exclusively, 5 to a retention device for a hand held implement such as a pen or pencil.

In the fields of joinery, carpentry, building and similar trades, it is regularly necessary to use 10 writing implements such as pencils. Pencils are easily mislaid, causing loss of time and frustration to the user. Many practitioners of these trades have trained themselves to store a writing implement behind an ear or in a particular pocket, but such habits, 15 however strongly embedded, are not always reliable, and the writing implement can nevertheless be lost.

It is known to attach a pencil to one end of a length of string, the other end being attached to a workbench 20 or the like. However, this overly restricts the use of the pencil to a particular radius of a workshop, unless the string is made to be impractically long. Fixed length strings can present a hazard especially, when in the vicinity of machinery. It is also known 25 to hang a writing implement holder around the neck on a cord, the writing implement being removed for use and replaced after use. Such a device does not

overcome the problem that the writing implement is loose when in use, and can thus be mislaid; the neck cord is also potentially hazardous, especially when in the vicinity of tools or machinery.

5

The object of the present invention is to provide a retention member which securely retains an implement adjacent the hand whether in use or not, and which overcomes the problems mentioned above.

10

According to the invention there is provided a retention device for an implement including attachment means for enabling the device to be carried on a user or their clothing, retraction means, and a flexible elongate member extendable from the retraction means, the elongate member being adapted to be retracted by the retraction means, and having a distal end adapted to be attached to an implement.

15

The device may include an implement and the implement may take any suitable form. The implement may be a hand held implement and may comprise, for example, a writing implement such as a pen or pencil. In another embodiment the implement may be an earpiece for a radio, telephone or videophone. In a further embodiment the implement may be a tool such as a screwdriver or electrical current tester. In a

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further embodiment the implement may be a bar code reader.

The device may be arranged to be attached to the  
5 forearm of the user's usual writing hand where the  
implement is a writing implement, thus minimising the  
length of elongate member drawn out. Typically the  
length of elongate member drawn out is in the range  
100mm-150mm only though the device may retain a much  
10 greater length for use in special circumstances, for  
example when circumstances dictate that the other hand  
is occasionally used for writing.

The retraction means may take any suitable form. The  
15 retraction means may comprise an electric motor, for  
example. In a preferred embodiment, the retraction  
means comprises a coiled spring having an inner end  
and an outer end, the inner end being attached to a  
base, the outer end being attached to one end of the  
20 elongate member. The retraction means may be housed  
within a housing which is preferably flat and may  
resemble a watch case.

The elongate member may be, for example, a tape,  
25 string or chain and is preferably substantially non-  
stretchable. The retraction means may exert a  
continual retraction force but preferably includes

releasable latching means to hold the elongate member at a required extension; such an arrangement permits effective retraction without imposing a constant load on a writing implement which may inhibit free movement thereof during use, for example writing. The latching means may operate automatically or may be required to be positively set by a user. The latching means may for example be released by a button adjacent the retraction means (which may also set the latching means), or by a partial further extension of the elongate member in the manner of a sharp tug.

10  
15  
In a preferred embodiment the elongate member is a tape. An advantage of a tape is that it is readily stored without entanglement by folding or coiling within a housing. The tape may be of a plastics material; the plastics material may be polyurethane.

20  
The elongate member may include length markings so as to act as a convenient tape measure. The elongate member may carry other useful information and/or advertisements.

25  
An advantage of the present invention is that an implement may be stored proximate the hand of the user while not in use, but when drawn out for use is retained against loss by the elongate member. In use

the device is preferably secured to the upper surface of the forearm which is a location which will not generally inhibit free movement of the user. In a preferred embodiment, the attachment means comprises a strap similar to a watch strap.

5 Preferably the device is generally symmetrical about the plane of strap attachments. An advantage of this arrangement is that the device has the same height  
10 above and below the attachments and may be readily inverted for use on either arm according to the preference of the user; left and right hand versions are thus unnecessary. Alternatively the attachment means may comprise a clip or other suitable means to  
15 enable the device to be carried on a belt worn by the user.

20 The device may include safety means adapted to release at least a portion of the elongate member on application of a predetermined load thereto. Such an arrangement reduces the potential hazard of the flexible elongate member being caught in machinery or the like. The pre-determined load may be 5 to 20lbs preferably about 10lbs. The safety means may comprise  
25 means to ensure that the elongate member breaks at a relatively low tension, especially low enough for a user to resist a machine pulling his forearm into a

hazardous position. Alternatively, a device may be provided having a tape which is designed to detach at a predetermined tension.

5 The device may include decorative or advertising material on the outer face thereof, or may incorporate a watch, compass, radio or the like.

In a preferred embodiment the device includes storage  
10 means arranged to receive an implement when the elongate member is in a fully retracted position. A shield may also be provided so that a working end of the implement, such as the point of a writing implement, is not exposed when retracted. The storage means is preferably formed integrally with a casing of the device. The storage means may be in the form of a sleeve or tubular extension of the device. Such a sleeve has the advantage that it provides a guide channel during retraction and thus avoids the  
15 implement catching on clothing. Also the sleeve prevents a writing implement from marking clothing and allows a user to remove or put on clothing without the risk of snagging of the implement. The shield may be integral with the storage means or in an alternative embodiment is mounted on the implement. The shield  
20 may then comprise a sliding sheath to cover the working end of the implement. The sheath may be  
25

arranged to be slid forwards to cover the working end of the implement by engagement with a stop on the device which may be fast with the storage means. The sheath may be capable of tilting with respect to the 5 implement. In this way if the implement is stored at an angle in the storage means the sheath can tilt to the perpendicular to give a more regular appearance. In an alternative embodiment a shield is not provided and the working end of the implement is retractable in 10 the manner of a ball point pen. The working end may be arranged to be retracted into the implement as a result of retraction of the implement.

15 The storage means and the implement may have corresponding internal and external cross-sectional shapes respectively so that the implement can only enter the storage means in one or two orientations. Preferably in this case the flexible member is a tape, as this will tend to orientate the implement 20 correctly. The implement may bear information on an outer surface to be viewed when the implement is retracted, for example, through a window in the storage means. The information may comprise an LCD display for example showing the time. The LCD display 25 may be reversible. The entrance to the storage means and the implement may have internal and external cross-sections respectively such that the implement

will be spaced from the lower edge of the entrance to the storage means when retracted. This will avoid any possibility of skin being trapped between the implement and storage means on retraction. For 5 example the implement may be oval and the entrance to the storage means of trapezoidal cross-section.

The implement may be attachable to the flexible elongate member by releasable securing means which 10 permits the implement to be readily replaced.

Preferably the implement is short to minimise protrusion thereof when in the retracted condition.

The securing means may be adapted to secure an implement selected from a range of different sizes.

15 In particular, the securing means may comprise an annular member having a radial pin threadingly engaged therewith for abutment against an implement passing through the annular member. Alternatively, other securing means are possible, such as the use of adhesive tape. Writing implements adapted for 20 incorporation in the present invention may be provided, including a bore extending radially proximate the end distal the nib, through which a ring may be passed, the elongate member being securable to 25 the ring.

In a preferred embodiment there is provided release

means to permit removal of an implement from the storage means. The release means may comprise an aperture in the storage means to allow an implement to be pushed by a finger outwardly of the storage means.

5 The release means may also comprise a purchase of the elongate member or of a writing implement against which a user may pull to release the writing implement.

10 Embodiments of the invention will now be described by way of example and with reference to the accompanying drawings in which:

15 Fig. 1 is a perspective view of a retention device according to the invention, a tape of the retention device being shown partially extended;

Fig. 2 is a perspective view of the retention device of Fig. 1 attached to a user's forearm and in use;

20 Fig. 3 is a plan view of an alternative embodiment of a retention device according to the invention with the tape fully retracted, and a portion of an upper face of a casing of the retention device being shown cut away;

25 Fig. 4 is a plan view of a third embodiment with the upper face of the casing cut away;

Fig. 5 is a detail view of the view of Fig. 4;

Fig. 6 is a plan view of a fourth embodiment;

Fig. 7 is a front elevation of the embodiment of Fig. 6;

Fig. 8 is a plan view of the fifth embodiment with the upper face of the casing cut away; and

Fig. 9 is a perspective view of the sixth embodiment.

Where appropriate, reference numerals are common to the embodiments.

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15

Referring to the drawings, a retention device 10 comprises a pen 12 having a nib 13, a flexible tape 14 extending from the end of the pen 12 distal the nib 13, and a casing 15.

Casing 15 includes parallel square upper and lower faces 16,17 and upright front face 18, side faces 19, 21 and back face 20 arranged to form a cuboid.

20

25

Extending from the two side faces 19,21 are watch strap attachment brackets 22,23 of any suitable kind, to which a watch strap 24 is attached. An aperture 25 passes through the front face 18 near one end thereof, and receives the tape 14. Extending from the lower face 17 of the casing 15 towards the upper face 16, is an upright pin 26, including a cleft 27 extending axially thereof. A coiled spring 28 is provided

within the casing 15, the coiled spring 28 having an inner end 29 and an outer end 30. The inner end 29 includes a thickened portion 31, the portion of the spring 28 nearest the thickened portion being inserted 5 into the cleft 27, the thickened portion 31 being sufficiently thick to prevent passage thereof through the cleft. The outer end 30 of the spring 28 is attached to the tape 14. The coiled spring 28 is pretensioned to urge the tape 14 through the slot and 10 into the casing 15. In this way, the tape 14 may be retracted within the casing 15. Alternatively, a cylindrical barrel (not shown) may be pivotably mounted within the casing 15. The tape may be arranged to coil about the outer surface of the 15 barrel, and the coiled spring may be attached to the inner surface of the barrel. An advantage of this arrangement is that a releasable ratchet system may act on the barrel to provide locking means for the retention device.

20

A storage sleeve 32 extends from the front face 18 and parallel to the side walls 19,21. The storage sleeve 32 comprises an upper face 33, a side face 34 and a lower face 35. The upper face 33 and the lower face 25 35 are co-planar with the respective upper and lower faces 16,17 of the casing 15. The side face 34 is co-planar with the side face 19 adjacent the end of the

front face 18 through which the aperture 25 passes.

The storage sleeve 32 is closed at the end distal the casing by an end face 36. In this way, the storage sleeve 32 is a three sided channel having at one end

5 the aperture 25. The storage sleeve 32 is sufficiently long to allow the pen 12 to rest therein and may include magnetic retention means to hold a steel part of the writing implement. An advantage of arranging the storage sleeve 32 to extend from one  
10 side of the casing 15 is that the sleeve 32 will not restrict visibility of a watch face if the device is worn on the same arm as a watch.

The end face 36 includes a portion 37 domed outwardly  
15 to provide an effective housing for the nib 13 of the pen 12. A slot 38 extends from the rim of the end face 36, the slot 38 being adapted to receive the tape 14 in a sufficiently tight fit to lock the tape 14 at a selected degree of extension.

20

An aperture 39 passes through side face 34 and is adapted to allow a user to pass a finger therethrough to remove the pen 12 from the storage sleeve 32.

25 Alternatively the pen may include a ring to be grasped for removal from the storage sleeve 32. This ring could be particularly useful for grasping between the teeth of the user in circumstances where the user's

other hand is not available.

Referring specifically to Fig. 3, an aperture 40 in the front face 18 of the casing 15 extends over the 5 cross-section of the storage sleeve 32, instead of aperture 25. In this way, the pen 12 can be retracted into the casing 15, to reduce the projection thereof. In this embodiment, the end of the pen 12 distal the 10 nib 13 may be curved, tapered or otherwise shaped in order to ease entry of the pen into the casing 15.

It will be appreciated that the locking means, rather than consisting of slot 38, or a ratchet, could instead consist of a brake system as employed on many 15 retractable tape measures. Alternative implements such as bar code readers could equally be used in conjunction with the present invention as a substitute for the pen 12. It is also envisaged that under certain circumstances it may be desirable to provide a 20 motorised retraction means within the casing.

The writing implement may include both a pen and pencil projecting side by side in a generally flat holder. Such an arrangement permits the lowermost of 25 the pen and pencil to be used according to the preference of the user. Alternatively the pen and pencil could be advanced to a use condition by a

conventional press button or slide arrangement.

In the third embodiment, the retention device 10 includes a casing having parallel upper and lower surfaces 16,17 and front face 18 which consists of two portions perpendicular to the upper and lower faces 16,17 and at a shallow angle to one another so that the front face 18 is convex. The smaller portion of the front face 15 includes an aperture 54 to receive a pen 12. The pen 12 is received diagonally across the casing 15 to the opposite corner 56 from the aperture 54 such that the longitudinal axis of the pen 12 and the plane of the portion 50 of the front face 18 are perpendicular. In the other rear corner of the casing 15 is provided a spring and tape arrangement 14,28 similar to that of the first and second embodiments.

In the opposite corner of the casing 15 from the coiled spring 28 is provided a chamber 58 to receive re-fill cartridges 60 for the pen 12. The chamber 58 is opened by a sliding door 62 on the portion 52 of the front face 18.

A sheath 64 is provided on the working end 66 of the pen 12. The sheath 64 is slidably captive on the end of the pen 12 and can be slid forwards to cover the nib 68 of the pen so that the pen cannot write or mark

clothing, for example, and can be slid backwards so that the pen nib 68 is exposed and can be used. The maximum diameter of the sheath 64 at its rear edge is larger than the width of the aperture 54.

5

In use, the pen is retracted from the casing by pulling on the sheath 64. The pen body is then grasped and the sheath 64 is pulled back to expose the nib 68 for writing. When the user has finished writing he releases the pen which is automatically retracted by the spring 28 into the casing 15. When the pen 12 is nearly fully retracted, the sheath 64 will come into contact with the front face portion 50 of the front wall 18 and the force of retraction exerted by the spring 28 and the momentum built up by the pen 12 will be sufficient to urge the sheath 64 forwards to cover the nib 68 again.

20 The tape 14 extends from the rear of the pen 12 along the back face 20 of the casing 15 to the coiled spring 28. A reaction surface 70 is provided parallel to and close to the back face 20. A slider 71 is mounted in the back wall 20 and has a ridged portion 72 outside the casing 15 connected through a slide slot 74 to a 25 wedge shaped portion 76 inside the casing. The wedge shaped portion 76, when moved forwards by the ridged portion 72 towards the coiled spring 28 will trap the

tape 14 against the reaction surface 70 thereby acting as a latch to take tension off the tape. The wedge shaped portion 76 is urged into the open position away from the coiled spring 28 by a compression spring 78.

5 The tape 14 can thus be released either by pushing the ridged portion 72 away from the coiled spring 28, or by tugging on the pen, which will by frictional reaction and the compression spring 78 urge the slider 71 away from the coiled spring 28 and thereby release  
10 the tape 14 so that it can be retracted by the coiled spring 28. The taper is made of polyurethane and has a breaking strength of 101bs.

In the fourth embodiment, the casing 15 is taller and  
15 the pen 12 is received in the casing in a plane above the plane of the rewinder spring 28. In this embodiment the casing 15 includes a window 79 which may be covered by a plastic panel or may be open. The pen 12 includes an LCD display 80, which may show the time, and which is visible through the window 79 when  
20 the pen is fully retracted. The display 80 may be reversible to enable the device 10 to be worn on either wrist with the LCD display 80 the correct way up. This may be done electronically as a result of  
25 pressing a switch controlling the LCD display 80. Alternatively, the LCD display may be removable from the pen 12 so that it can be re-fitted in the opposite

orientation. The pen 12 may be oval in cross-section having flat upper and lower surfaces while the aperture 54 in the casing to receive the pen 12 may be in the shape of a rounded trapezium, the longer parallel face being at the upper surface 16 of the casing 15. The pen 12 is so wide that it will only fit in the upper part of the trapezium shaped aperture 54. In this way, there is no risk of the user's skin or hair being trapped between the pen and the lower surface of the opening 54. Also, as the trapezium shaped aperture 54 is less tall than the pen is wide, the pen will always be retracted with one of the flat surfaces pointing upwards. The tape 14 will resist being twisted and so will ensure that it is the upper face bearing the LCD 80 which is always upwards when the pen is retracted and therefore the LCD 80 will always be visible through the window 79 when the pen is retracted.

Fig. 8 shows a further embodiment which looks outwardly similar to the embodiment of Figs. 6 and 7 but does not include the window 79 and in which the casing 50 is shallower than in the previous embodiment. The coiled spring 28 is provided alongside the pen 12 which is again received at an angle, as in the third embodiment, although the aperture 54 is centrally of the casing 15 on the front

face 18. The sheath 64 is mounted on the pen 12 in such a manner that it can tilt with respect to the pen 12. When the pen 12 is retracted into the casing 15, the sheath 64 will engage the front face 18 of the casing 15 and, as before, will be pulled forwards to cover the nib 68 of the pen. However, the sheath 64 will also tilt as the pen is drawn further into the casing 15 so that it lies perpendicular to the front face 18 and presents a symmetrical appearance even though the components within the casing including the pen 12 are asymmetrically arranged.

As an alternative to the sheath 64, the nib 68 may be retracted into the body of the pen by the type of mechanism normally used on retractable ball point pens. This may be operated by a collar around the end of the pen which, like the sheath 64, engages the front face 18 of the casing 15 as the pen is withdrawn into the casing 15 through the aperture 54.

While the devices 10 of the embodiments have been shown on a wrist strap, it is equally possible for the devices 10 to be provided without strap connections and with a clip so as to be clipped onto a belt for example.

In the sixth embodiment, the casing 15 has a twelve

keypad 81 on its upper surface 16. A microphone 82 is also provided on the upper surface 16 and a telescopic aerial 84 can be extended from the casing 15. The electronic components necessary for the 5 device 10 to act as a telephone are encased in the casing with the loudspeaker comprising an earpiece 86 which is retractable on a cord 14 into the casing by a coiled spring 28 as before.

10 In use the wearer pulls out the earpiece 86 and inserts it in his ear. He then dials the number required on the keypad 81 and speaks into the microphone 82 to use the telephone in the normal way. The telephone device is very compact and cannot be 15 lost or left behind as it is strapped onto the user's wrist.

20 In an alternative embodiment, the keypad 81 may not be a mechanical operation keypad but may use a touch sensitive screen. The screen may change, once the connection has been made, to show a picture of the person at the other end of the line so that the device is a videophone. The device may incorporate a camera 88 so that pictures can also be sent.

CLAIMS

1. A retention device for an implement including attachment means for enabling the device to be carried on a user or their clothing, retraction means, and a flexible elongate member extendable from the retraction means, the elongate member being adapted to be retracted by the retraction means, and having a distal end adapted to be attached to an implement.

2. A retention device as claimed in claim 1, wherein the retraction means comprises an electric motor.

3. A retention device as claimed in claim 1, wherein the retraction means comprises a coiled spring having an inner end and an outer end, the inner end being attached to a base, the outer end being attached to one end of the elongate member.

4. A retention device as claimed in claim 1, 2 or 3, wherein the retraction means is housed within a housing.

5. A retention device as claimed in claim 4, wherein the housing is flat.

6. A retention device as claimed in any preceding claim, wherein the elongate member is substantially non-stretchable.

5 7. A retention device as claimed in any preceding claim, wherein the elongate member is a tape.

10 8. A retention device as claimed in claim 7, wherein the tape is of a plastics material.

9. A retention device as claimed in claim 7, wherein the tape is made of polyurethane.

15 10. A retention device as claimed in any preceding claim, wherein releasable latching means is provided to hold the elongate member at a required extension.

20 11. A retention device as claimed in 10, wherein the latching means is arranged to be positively set by a user.

25 12. A retention device as claimed in claim 10 or claim 11, wherein the latching means is arranged to be released by a partial further extension of the elongate member in the manner of a sharp tug.

13. A retention device as claimed in any preceding claim, wherein the attachment means is arranged to secure the device to the upper surface of a user's forearm.

5

14. A retention device as claimed in claim 13, wherein the attachment means comprises a strap similar to a watch strap.

10

15. A retention device as claimed in claim 14, wherein the device is generally symmetrical about the plane of strap attachments.

15

16. A retention device as claimed in any of claims 1 to 13, wherein the attachment means comprises a clip to enable the device to be carried on a belt worn by the user.

20

17. A retention device as claimed in any preceding claim, wherein the device includes safety means adapted to release at least a portion of the elongate member on application of a predetermined load thereto.

25

18. A retention device as claimed in claim 17, wherein the pre-determined load is between 5 and 20lbs.

19. A retention device as claimed in claim 17 or claim 18, wherein the safety means comprises means to ensure that the elongate member breaks at a relatively low tension.

5

20. A retention device as claimed in claim 17 or claim 18, wherein the elongate member is designed to detach from the implement or retraction means at a predetermined tension.

10

21. A retention device as claimed in any preceding claim, wherein the device includes storage means arranged to receive an implement when the elongate member is in a fully retracted position.

15

22. A retention device as claimed in claim 21, wherein the storage means is formed integrally with a casing of the device.

20

23. A retention device as claimed in claim 21 or claim 22, wherein the storage means is in the form of a sleeve or tubular extension of the device.

25

24. A retention device as claimed in claim 21, 22 or 23, wherein the storage means and the implement have corresponding internal and external cross-sectional shapes respectively so that the implement

can only enter the storage means in one or two orientations.

25. A retention device as claimed in any preceding claim, wherein the implement bears information on an outer surface to be viewed when the implement is retracted.

10 26. A retention device as claimed in claim 25 when dependent on any of claims 22 to 24, wherein the information is to be viewed through a window in the storage means.

15 27. A retention device as claimed in claim 25 or 26, wherein the information comprises an LCD display.

28. A retention device as claimed in claim 27, wherein the LCD display is reversible.

20 29. A retention device as claimed in any of claims 21 to 28, wherein the entrance to the storage means and the implement have internal and external cross-sections respectively such that the implement will be spaced from the lower edge of the entrance to the storage means when retracted.

25 30. A retention device as claimed in any of

claims 21 to 29, where in the implement is oval and the entrance to the storage means of trapezoidal cross-section.

5 31. A retention device as claimed in any of claims 21 to 30, wherein there is provided release means to permit removal of an implement from the storage means.

10 32. A retention device as claimed in claim 31, wherein the release means comprises an aperture in the storage means to allow an implement to be pushed by a finger outwardly of the storage means.

15 33. A retention device as claimed in claim 31 or claim 32, wherein the release means comprises a purchase of the elongate member or of an implement against which a user may pull to release the implement.

20 34. A retention device as claimed in any preceding claim, wherein a shield is provided so that a working end of the implement is not exposed when retractable.

25 35. A retention device as claimed in claim 34 when dependent on any of claims 21 to 33, wherein the

shield is integral with the storage means.

36. A retention device as claimed in claim 34,  
wherein the shield is mounted on the implement.

5

37. A retention device as claimed in claim 36,  
wherein the shield comprises a sliding sheath to cover  
the working end of the implement.

10 38. A retention device as claimed in claim 37,  
wherein the sheath is arranged to be slid forwards to  
cover the working end of the implement by engagement  
with a stop on the device.

15 39. A retention device as claimed in claim 37 or  
claim 38, wherein the sheath is capable of tilting  
with respect to the implement.

20 40. A retention device as claimed in any of  
claims 1 to 33, wherein the working end of the  
implement is retractable in the manner of a ball point  
pen.

25 41. A retention device as claimed in claim 40,  
wherein the working end is arranged to be retracted  
into the implement as a result of retraction of the  
implement.

42. A retention device substantially as described herein with reference to the accompanying drawings.

5 43. The combination of a retention device as claimed in any preceding claim and an implement attached to the elongate member.

10 44. A combination as claimed in claim 43, wherein the implement is a writing implement.

45. A combination as claimed in claim 43, wherein the implement is an earpiece for example for a radio, telephone or videophone.

15 46. A combination substantially as described herein with reference to the accompanying drawings.



Application No: GB 9608036.1  
Claims searched: 1-46

Examiner: Graham Russell  
Date of search: 14 May 1997

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B6P (PAA, PAGE)

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Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	US 4951856 (HORGAN) see column 3 lines 13-20 & column 7 lines 1-54	1,3-6, 13,14, 21-24,44
X	US 2793617 (PALMER) see column 4 lines 47-54	1,3-6, 13,14, 21-24,44
X	US 1577272 (TREADAWAY) see page 2 column 1 lines 25-35	1,3-6, 13,14, 21-24,44

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.